

# Unit Planning Guide: Algebra 1 Unit 1 of 8

<b>Unit Title:</b> Linear Equations and Inequalities	<b>Pacing (Duration of Unit):</b> 10 weeks
<b>Grade:</b> Algebra 1	<b>Buffer Day(s):</b>

## Desired Results

### Transfer Goals (Priority practice standards in **bold**)

*Students will be able to independently use their learning to:*

- MP.1. Make sense of problems and persevere in solving them.
- MP.2. **Reason abstractly and quantitatively.**
- MP.3. **Construct viable arguments and critique the reasoning of others.**
- MP.4. **Model with mathematics.**
- MP.5. Use appropriate tools strategically.
- MP.6. Attend to precision.
- MP.7. Look for and make use of structure.
- MP.8. Look for and express regularity in repeated reasoning.

### Established Goals (2011 MA Curriculum Frameworks Standards Incorporating the Common Core State Standards)

#### Prerequisite Standards:

- 8.NS.2: Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g.,  $\pi^2$ ).
- 8.EE.1: Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,  $32 \times 3^{-5} = 3^{-3} = 1/33 = 1/27$ .*
- 8.EE.7: Solve linear equations in one variable.
- 8.EE.7a: Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form  $x = a$ ,  $a = a$ , or  $a = b$  results (where  $a$  and  $b$  are different numbers).
- 8.EE.7b: Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

#### WIDA for English Language Learners

Standard 1: ELLs **communicate** for **Social** and **Instructional** purposes within the school setting  
 Standard 3: ELLs **communicate** information, ideas and concepts necessary for academic success in the content area of **Mathematics**

In the lesson planning stage, teachers will need to differentiate lessons for ELLs. In order to accomplish this they will need: 1.) this curriculum map, 2.) a list of their ELLs and their proficiency levels, and 3.)

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- 8.F.2: Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.*
- 8.SP.2: Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

appropriate language function expectations and scaffolds or supports.

### Standards (Priority Standards in **bold**):

- **A-CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. ★**
- **A-CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. ★**
- **A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods. ★***
- **A-CED.4 Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law  $V = IR$  to highlight resistance  $R$ . ★***
- **A-REI.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.**
- **A-REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.**
- **A-REI. 10 Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).**
- **A-REI.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.**
- **A-SSE.1 Interpret expressions that represent a quantity in terms of its context. 1b: Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret  $P(1 + r)^n$  as the product of  $P$  and a factor not depending on  $P$ .***
- **F-IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and**

\* indicates Modeling standard.

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tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.*

- F-IF.6 Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.
- F-IF.7a: Graph linear and quadratic functions and show intercepts, maxima, and minima. ★
- N-Q.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

### Meaning (\*Mostly assessed through Performance Tasks/Assessments)

**Big Ideas:** (Statements and concepts written in teacher friendly language which reflect the important [but not obvious] generalizations we want students to be able to arrive at. These are used by the teacher to focus daily instruction.)

- Solutions to equations and inequalities have multiple representations (tables, graphs, equations and stories).
- Solving linear equations involves a process of creating simpler equivalent equations
- There are multiple approaches to solving equations
- The graph of an equation illustrates its set of solution(s)
- Maintaining equivalence is a necessary component of solving equations
- Equations that look different may be equivalent
- Real-world situations can be modeled using a variety of representations, and the key features of those representations provide clues to both interpreting and building mathematical models
- Solutions to real-world problems are limited by constraints, which can affect the interpretation of the problem in context

**Essential Questions:** (Questions which frame ongoing and important inquiries about the big ideas. They are written for students and used in daily instruction to help engage students in meaningful thinking.)

- How can we use expressions, equations, and inequalities to model and solve real world problems?
- What do graphs show?
- How are the different ways that we represent data related to each other, and what can we learn by looking at this data in different ways?

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### Acquisition (\*Mostly assessed through traditional summative assessments)

**Knowledge:** Key basic concepts, facts, and key terms (written in phrases) students should be able to recall independently.

*Students will know ...*

- The relationship between equation, table and graph
- The difference between an equation and an inequality
- The difference between an equation and an expression
- The properties of Real Numbers and how they are used to solve equations
- Equations and inequalities may have constraints that need to be included when modeling the problem
- Equations can have no solution, one solution or multiple solutions

**Key Academic Vocabulary:**

Valid solution

No solution

Infinitely many solutions

One solution

Inverse operation

Constraints

Function

Linear

Quadratic

Exponential

Rational number

Irrational number

**Skills:** The discrete skills and process students should be able to use independently.

*Students will be skilled at:*

- Using Properties of Operations and Equality to solve equations
- Solving and justifying the solution process
- Determining the validity of a solution within a given context
- Using mathematical structures such as a graph or table to strategically solve problems
- Solving and graphing inequalities in one and two variables
- Selecting appropriate models (linear, quadratic, exponential, simple rational) to solve problems
- Translating verbal descriptions of relationships into algebraic equations and inequalities
- Solve absolute value equations and inequalities in one variable

**Resource Suggestions:**

Note: good teaching strategies such as foursquare, link sheets and other common strategies that help to teach the equation/table/graph/summary do not lend well to separating the unit. The selected strategies of each individual teacher to teach the frameworks will be used in a layered technique that ultimately keeps the standards together.

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